EA-0874; Environmental Assessment, Low-level Waste Drum Staging Building at Weapons Engineering Tritium Facility, TA-16, Los Alamos National Laboratory, Los Alamos, New Mexico

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EXECUTIVE SUMMARY

The proposed action is to place a 3 meter (m) by 4.5 m (10 ft x 15 ft) prefabricated storage building (transportainer) adjacent to the existing Weapons Engineering Tritium Facility (WETF) at Technical Area (TA-) 16, Los Alamos National Laboratory (LANL), and to use the building as a staging site for sealed 55-gallon drums of noncompactible waste contaminated with low levels of tritium (LLW). Up to eight drums of waste would be accumulated before the waste is moved by LANL Waste Management personnel to the existing on-site LLW disposal area at TA-54. The drum staging building would be placed on a bermed asphalt pad, near other existing accumulation structures for office trash and compactible LLW.

The no-action alternative is to continue storing drums of LLW in the WETF laboratories where they occupy valuable work space, hamper movement of personnel and equipment, and require waste management personnel to enter those laboratories in order to remove filled drums.

No new waste would be generated by implementing the proposed action; no changes or increases in WETF operations or waste production rate are anticipated as a result of staging drums of LLW outside the main laboratory building. The site for the LLW drum staging building would not impact any sensitive areas. Tritium emissions from the drums of LLW were included within the source term for normal operations at the WETF; the cumulative impacts would not be increased.

1.0 BACKGROUND

Los Alamos National Laboratory (LANL) will generate about 10 drums per year of solid, noncompactible low-level radioactive wastes (LLW). LANL has long-term management and disposal capability for such wastes, but an interim collection or staging location for the drums outside the WETF is needed. Based on process knowledge, none of this waste is regulated as hazardous or mixed waste. Operations of the WETF, including LLW management, were described in the WETF EA (DOE 1991). The WETF is expected to reach full operational status in 1994. It is operated

by the LANL Weapons Subsystems Group, WX-5.

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA) to evaluate a proposed LLW drum staging building and to compare the potential impacts of the proposed action with those of a reasonable alternative. The purpose of the EA is to provide the U. S. Department of Energy (DOE) with sufficient information to determine whether a Finding of No Significant Impact (FONSI) is warranted for the proposed action or whether an Environmental Impact Statement (EIS) must be prepared. The assessment of impacts presented herein is based on conservative assumptions that maximize estimates of chemical releases and human exposures. The environmental consequences of operating the proposed staging building are expected to be less than the potential consequences presented here.

The proposed project is identified in the DOE tracking system as AL-LAN-92-038.

1.1 Need and Purpose

The mission of the WETF, as described in the EA for the facility, is to repackage small quantities of tritium to meet precise requirements of experiments (DOE 1991). In the course of this work, noncompactible waste such as used and broken valves, plumbing parts, vacuum pumps, molecular sieves, and vacuum pump oil will be generated. Wastes generated in the WETF laboratories where tritium is used are assumed to be contaminated with tritium, making it LLW. The LLW is accumulated in 30 gallon drums overpacked with 55-gallon drums (81 centimeters [23 inches] diameter and 92 centimeters [36 inches] high). At present, drums must be kept in tritium-handling areas (laboratories) of the WETF until they are taken out by WETF personnel and transferred by the LANL Waste Management Group personnel to the existing LANL LLW management area at Technical Area 54 (TA-54), Area G for disposal. Since all WETF laboratory spaces have been allocated on a priority basis either for permanently installed equipment, or reserved for incoming tritium shipments, no more than one noncompactible waste drum can be stored inside the WETF building.

In addition to the lack of short term storage space inside the WETF for waste drums, the presence of such drums reduces scarce useable work space, hampers the movement of WETF personnel, and exposes WETF personnel to releases of tritium when drums are unsealed to receive more waste. Although personnel doses are within regulatory limits, less than 5 rem per year, the DOEÆs goal is to reduce doses to personnel to as low as reasonably achievable (ALARA).

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Relationship of Proposed Action to Other NEPA Documents and DOE Decisions

The proposed action has no relationship to other NEPA documents or other DOE decisions, except for those related to the WETF, as discussed above. Any other facility considered for construction at TA-16 would be addressed through NEPA as part of the decision-making process. The proposed action is not within the scope of the DOE Programmatic EIS on reconfiguring the weapons complex as described in the Revised Notice of Intent to prepare that document (DOE 1993).

2.2 Background: Waste Description and General Practices

The WETF was built at TA-16 in 1982-84, as a replacement for the High Pressure Tritium Laboratory, Building 86 at TA-33, a facility for tritium repackaging. An EA was prepared on the operation of the WETF (DOE/EA-0504, DOE 1991) and a Finding of No Significant Impact (FONSI) was signed on March 22, 1991. The identity, volume, transportation, and disposal of waste from the WETF were discussed in the EA (DOE 1991); no changes or increases in WETF operations or in waste production rate are projected as a result of implementing the proposed action. Tritium emissions from this waste were included as part of the emissions expected during normal operations at the WETF, which were found to pose no significant impact to on-site personnel or to members of the public.

During routine operations in the WETF, solid noncompactible wastes are generated in the tritium handling laboratories. These consist of:

- stainless steel, brass, and copper fittings, equipment, and tubing;
- dismantled vacuum pumps;
- used molecular sieve canisters from vacuum pumps; and
- used vacuum pump oil.

The waste minimization program is not expected to reduce or eliminate the volume of noncompactable LLW because this material consists of used, worn out, and broken pieces of equipment. Generating this waste cannot be avoided. Continuing to use such equipment would not be a safe practice. Waste from the areas where tritium is used is assumed to be contaminated with tritium, and thus to be LLW. Because of its small molecular size, tritium can diffuse into (and through) solids. Tritium can substitute chemically for hydrogen in organic compounds such as oils and solvents.

Mixed waste contains radioactive components plus material regulated as hazardous waste under the Resource Conservation and Recovery Act (RCRA). Vacuum pump oil is not regulated as a hazardous waste. Thus, tritium-contaminated pump oil is a LLW rather than mixed waste. No mixed waste would be placed in the drum staging facility.

Two types of waste molecular sieves will result from operations at the WETF. The type addressed in this EA are small molecular sieve canisters (0.5 liter or 1 pint volume) that are routinely attached between tritium apparatus and vacuum pumps. These small molecular sieves are discarded as LLW after use. Management of large molecular sieves, which are a part of the WETF subsystems to contain and capture leaked tritium in the air exhaust system, is addressed in the WETF EA (DOE 1991). The large molecular sieves would not be processed through this drum staging building.

The long-standing practice at LANL tritium facilities is that noncompactible LLW is collected in labeled 30-gallon drums overpacked with 55-gallon drums, with tritium absorbing material such as asphalt between the drum walls. Dry ground-up corn cobs, called corn cob fraction, or vermiculite is used as packing around the metal pieces. This dry material sorbs any tritiated water vapor, oil residues, and solvents from the metal parts. Used vacuum pump oil is poured into a drum filled with corn cob fraction which acts as an oil sorbant. The lids of both drums are sealed except when waste is being added. When a drum is filled to capacity, the top of the inner drum is sealed in place, asphalt is poured on top, and the 55-gallon drum top is sealed in place. The drum is labeled and manifested before LANL waste management personnel accept it for disposal. Disposal of noncompactible tritiated waste of weight greater than 35 pounds in such a manner explicitly complies with LANL Administrative Requirement 10-2 (LANL 1991).

Noncompactable LLW management at WETF consists of LANL waste management personnel moving the drums containing waste from the WETF loading dock to TA-54, Area G where it will be disposed of as discussed in the WETF EA (DOE 1991). The drums of waste will be buried at the existing LLW disposal area, TA-54 Area G. Tritiated wastes have long been disposed at Area G. The contribution from the WETF to the LLW disposed at Area G will be extremely small, about 1.5 millicurie (mCi) per drum or 15 mCi per year, assuming that 10 drums of waste are generated per year.

2.3 Proposed Action: Erect and Operate a LLW Drum Staging Building

The proposed action is to erect and operate a satellite waste staging building immediately adjacent to the WETF for drums of LLW, in an area where compactible LLW and sanitary waste are already staged. A prefabricated building 3 meters (m) by 4.5 m (10 ft by 15 ft)(transportainer) would be placed on a bermed asphalt pad and would contain the drums until LANL waste management personnel transfer them to the waste management and disposal area at TA-54. The transportainer type of building has passive ventilation. The LLW drum staging building would not be equipped with a fire suppression system, a tritium removal system, or an atmospheric monitor. No regulations or LANL procedures would require or justify their use, based on risk and expected emissions of the building. There would be no flammable materials outside the sealed drums to support a fire and no ignition sources would be present. As a result, there is virtually no chance of a fire. The building would not require the installation of a tritium removal system since the quantity of tritium which might escape from the drums would be extremely small, not in excess of 7.5 mCi/year.

The worker who would be adding waste to a drum would always be accompanied by a Radiation Control Technician equipped with a portable tritium monitor. When the waste drum is unsealed, the Radiation Control Technician would insert the probe of the monitor into the air space within the drum (head space) to measure the tritium concentration. Should the level exceed safe level, the drum would be resealed and other measures, such as equipping the workers with supplied breathing air, would be implemented to prevent the worker inhaling excessive tritium. The drum could also be permanently sealed and sent for disposal.

The drum staging building would hold a maximum of 8 drums, some of which may be empty. Based upon the history of TA-33 (the facility WETF replaces), eight drums constitutes a very adequate storage capacity. The 10 drums/year is a very conservative estimate for noncompactible waste generation at WETF.

Drums containing waste would be immediately moved from the WETF into the staging building by WETF personnel. The distance between the WETF and the drum staging building would be about 30 m (100 feet). Future waste designated for the drums would be placed inside double plastic bags, sealed, and hand carried across the asphalt drive to the drum staging building. When a heavy object such as a pump is to be moved, a dolly or cart would be used. The individual moving the waste and the Radiation Control Technician would wear anti contamination clothing and rubber gloves as specified in DOE Order 5480.11. No extra change of clothing would be required as they would be working in the WETF Controlled Area. The waste items, in most cases, would be contained at the job site in plastic bags while their disposition (repair or waste) was determined. Thus, very few additional plastic bags would be disposed of as waste. If an operation is planned which would generate a large volume of noncompactible waste, the drum(s) could be brought inside the WETF for that operation. In most cases, future waste would be placed in the drums inside the staging building as it is generated. A maximum of 8 drums would be filled before LANL waste management personnel move the waste from the drum staging building to TA-54 for disposal.

Access to the WETF area is controlled and is normally limited to individuals having access to National Security information. In addition, the LLW drum staging building would be locked to prevent unauthorized access. The building would be entered only under guidance provided by a WETF Radiation Protection Technician. Because a maximum of 7.5 mCi of tritium could escape from the drums into the drum staging building annually, a radiation monitoring device would not be needed.

2.4 Alternatives Considered but Dismissed as Unreasonable

2.4.1 Utilize a LLW Drum Staging Building at Another Facility

Moving the WETF LLW drums to another LLW drum staging area at TA-16 would present identical environmental impacts with those of the proposed action, but a more remote building would be less convenient to use because the waste would have to be transported farther. Each individual package of waste would have to be manifested and packaged for transportation.

2.5 No-Action Alternative: Stage LLW Drums in the WETF

The no-action alternative is for each drum of LLW to be filled to capacity in the tritium-handling laboratories within the WETF building. Since there is physically not enough space in the WETF building to store filled drums, the LANL waste management personnel would then be called to pick up each filled drum to be transported to TA-54. WETF personnel would then move the filled and sealed drum from the WETF lab to the loading dock. Waste management personnel would be allowed to gain access to the TA-16 controlled area to pick up and remove the waste only after receiving proper site-specific training. Site-specific training includes training current waste management personnel and their alternates as well as maintenance of a training database for these personnel. Eight times as many round trips would be needed to transport the waste - one trip for each drum compared with one trip for eight drums in the proposed action.

3.0 AFFECTED ENVIRONMENT

3.1 General Description

Detailed descriptions of LANL environs, its geology, climatology, meteorology, hydrology, population distribution, and environmental monitoring program are presented in the annual Environmental Surveillance Reports (see LANL 1993).

Los Alamos National Laboratory is a DOE facility, located on 111 km2 (43 mi2) of land in Los Alamos County in north-central New Mexico, approximately 100 km (60 mi) north-northeast of Albuquerque and 50 km (30 mi) west of Santa Fe. LANL is on the Pajarito Plateau, a series of mesas and canyons, at an elevation of about 2,200 m (7,200 ft) above sea level. Los Alamos has a semiarid, temperate mountain climate with about 45 cm (18 in.) annual precipitation. The location is shown in Figure 1.

3.2 Specific Area Affected

The site for the proposed action and the no-action alternative is described in the WETF EA (DOE 1991) and is shown in relation to LANL and Los Alamos County in Figure 2. The LLW drum staging building would be located in a developed area, about 45 m (150 ft) east of the WETF, behind the facility security fence, on an asphalt pad next to dumpsters for sanitary trash and compactible LLW, as shown in Figure 3.

The area is a level, partially wooded mesa top that contains no permanent streams, floodplains or wetlands. The surrounding vegetation is ponderosa pine with an understory of mixed grasses, forbs, and shrubs. Soils in the area are Tocal and Frijoles fine sandy loams (Nyhan 1978).

3.3 Affected Population

Los Alamos County has a population of 18,115, based on the 1990 U. S population census. The county contains two residential and commercial areas, the Los Alamos townsite with a population of 10,870 and White Rock with a population of 7,246. The site for both proposed action and the no-action alternative is 1,400 feet (a quarter mile) from LANL boundary on West Jemez Road which is the nearest point of public access, 0.8 kilometers (km) (2,500 ft, 0.5 mi) from the nearest campgrounds of Bandelier National Monument which is the nearest point inhabited throughout the year, and 6 km (18,000 ft, 3.5 mi) from Los Alamos townsite which is the nearest population area.

3.4 Air Emissions from the Project Area

The doses to nearby individuals and populations are included in those calculated for the WETF and are presented in Table 1 below. Doses due to managing the LLW in drums are shown in Table 2. These doses will not be affected by the location of the waste drums.

The airborne emissions from the drums are assumed to be 7.5 mCi/year, 0.75 mCi from each of the 10 drums that might be filled within a year. For the no-action alternative, this would be dispersed within the WETF, which has a volume of 7,400 cubic ft. The complete change in the volume of air in the building, the air change rate, is assumed to be one change per hour.

The doses to personnel in an adjacent facility and to members of the public are included in analyses presented in the WETF EA (DOE 1991) where annual emissions of 400 Ci are assumed. Actual emissions from the WETF are expected to be about 25 Ci per year. Estimates are based on project staff members' experience with other LANL tritium facility operations. The 400 Ci/year emissions estimate is considered to be very conservative.

3.4.1 Doses from Ongoing Operations

LANL supports an ongoing environmental surveillance program, as required by DOE orders (DOE 1981, 1988a). This program includes routine monitoring programs for radiation, radioactive emissions and effluents, and hazardous

materials management at LANL. The committed effective dose equivalents (CEDE), referred to for brevity as doses, to individuals are calculated for routine Laboratory operations. Information developed under the monitoring program is presented in detail in the annual Environmental Surveillance Reports (for example, LANL 1993).

The background radiation dose to an average individual living in Los Alamos was 337 mrem in 1990; the additional dose attributable to all Laboratory operations was 0.15 mrem (LANL 1992). For comparison, the EPA limits dose via the air pathway from any DOE facility to a member of the public to 10 mrem/year above background (40 CFR 61, Subparts A and H, EPA 1991). The DOE Radiation Protection Standard for exposure to members of the public from all pathways is 100 mrem per year above background (DOE 1990).

As the WETF is not yet fully operational, exposures to members of the public are not known. Based on assumed emissions of 400 Ci/yr, the doses and risks of nearby individuals and populations developing excess fatal cancers from overall WETF operations are shown in Table 1. The assumed emission is conservative and based on experience at LANL with other tritium facilities, as discussed above. These dose estimates would be independent of whether the waste drums are staged in a support building (proposed action) or in the WETF (no-action alternative). The dose to the WETF workers from normal operations is estimated to be 5 to 200 mrem/yr, as reported in the WETF EA (DOE 1991). The dose to the individual who adds waste to the drum could be as much as 0.34 mrem/year in addition to the dose associated with other WETF operations. This dose would be the same whether the drum is in a staging building or in the WETF. These doses are well within the EPA and DOE standards.

Table 1: Annual Doses and Risks of Excess Fatal Cancers to Nearby Individuals from LANL and WETF Operations

Exposure Source	Background[a]	Dose Increase due to LANL Operations[a]	Dose Increase due to all WETF Operations[b]	Risk of Excess Fatal Cancers due to WETF Operations
Individual (mrem)				
Bandelier Campground	3.4×10^{2}	not available[c]	8.0×10^{-5}	3.5×10^{-11}
Los Alamos	3.4×10^{2}	1.5×10^{-1}	1.5×10^{-4}	6.6×10^{-11}
White Rock	3.4×10^{2}	1.5×10^{-1}	5.3×10^{-5}	2.3×10^{-11}
Population[d] (person-rem)				
Los Alamos	3.6×10^{3}	1.3×10^{0}	1.5×10^{-3}	6.6×10^{-7}
White Rock	2.4×10^{3}	8.8×10^{-1}	4.9×10^{-4}	2.2×10^{-7}
Area within 80 km (50mi) radius of the Laboratory	7.0×10^{4}	3.1×10^{0}	3.7×10^{-3}	1.6×10^{-6}

a. Annual Surveillance Report (LANL 1992)
b. WETF EA (DOE 1991)
c. Not calculated separately for this location
d. Population of Los Alamos assumed to be 10,870; White Rock 7,246; and the area within a 80 km (50 mi) radium of LANL, 203,000.

4.0 ENVIRONMENTAL IMPACTS/CONSEQUENCES

4.1 Methodology

The tritium contamination level of solid LLW from WETF operations is estimated from that of similar waste generated at Building 86, TA-33, where tritium repackaging operations were performed until October 1990. The tritium content of LLW sent from Building 86 to TA-54 from 1988 through 1991 was about 13 mCi/cubic m, or about 1.5 mCi/drum, assuming that the entire volume (0.1139 cubic m) of the 30-gallon drum could be occupied by waste. In reality, because the waste is noncompactible and cannot occupy the entire volume of the drum, waste occupying 50% of the drum volume is a reasonable estimate.

Tritium gas is oxidized slowly to tritiated water; under natural conditions tritium oxidation rate is <1% per hour in soil and slower in air (Brown 1990). The rate of oxidation on metal surfaces is not well known and neither are the kinetics of desorption of tritium or tritiated water vapor from surfaces. However, because the measure of potential biological damage (the dose conversion factor) of tritiated water is 25,000 times as great as that for tritium gas (EPA 1988), the tritium in the LLW is assumed to be 100% tritiated water.

Each drum is assumed to contain 1.5 mCi tritium, entirely in the form of tritiated water. Half of the tritium in the waste is assumed to be released into the air when the drums are opened to add waste. The tritium released from each drum is assumed to be 0.75 mCi; ten drums are assumed to be filled per year. The annual release from 10 drums is assumed to be 7.5 mCi.

The committed effective dose equivalents (CEDE) to potentially exposed individuals and populations were calculated for releases due to normal operations using the AIRDOS EPA computer code with a release rate of 7.5 mCi/yr of tritiated water (Moore 1979). Doses from normal operations are estimated for a laboratory worker who is involved with this project (DOE 1988b), as well as for nearby individuals and populations.

Exposure to radiation increases an individual's chance of developing cancer. Consequences of the doses may be expressed as risk of excess fatal cancer cases. For tritium decay, a low linear energy transfer radiation, the BEIR V Report risk conversion factor is 440 cancer fatalities per 109 person-mrem. The derivation of this risk factor is based on the methodology discussed in Chapter I and IV of the BEIR V Report (NAS/NRC 1990, LANL 1992, Jacobson 1992). This agrees generally with another assumed risk of 400 cancer fatalities per 109 person-mrem for workers and 500 per 109 person-rem for the general population (NRC 1991).

4.2 Impacts of the Proposed Action: Erect and Operate a LLW Waste Drum Staging Building

4.2.1 Airborne Emissions

Because of the remote mesa-top location and the small scope and nature of the project, the environmental impacts of the proposed action and the no-action alternative differ only by placing a 10 ft x 15 ft building in a disturbed area and by dose and risk of developing fatal cancers to personnel in immediate proximity to the waste drums. The doses to personnel in an adjacent facility and to members of the public would not be different for the alternatives in question and are included in analyses presented in the WETF EA (DOE 1991) where annual emissions of 400 Ci are assumed. As stated above, actual emissions from the WETF are expected to be about 25 Ci per year.

Half the tritium contained in the waste is assumed to diffuse into the drum head space and to be released into the staging building atmosphere as the drum is opened to receive additional waste. Assuming that each drum releases 0.75 mCi into the building which has a volume of 34 cubic meters, the tritiated water concentration would be 0.02 mCi per cubic meter at the time waste is added. The tritium is assumed to diffuse completely from the building before the next waste addition.

The doses and risks of developing fatal cancers to nearby individuals and populations are included in those calculated for WETF operations and shown in Table 1 above in Section. 3.4.1. As the WETF cannot operate without generating this LLW stream, the dose due to managing this waste was included in the dose due to the overall operation (also shown in Table 1). The doses and risk of developing fatal cancer due only to managing this LLW in drums are shown in Table 2.

Table 2: Annual Doses and Risks of Excess Fatal Cancers for Normal Operations, Drum Staging Building

Location	CEDE / year	Risk of Excess Fatal Cancers
Maximum at Site Boundary (West Jemez Road, 1391 ft)	9.5×10^{-6} mrem	4.2×10^{-12}
Maximum Individual (Bandelier Campground, 2500 ft)	6.1×10^{-6} mrem	2.7×10^{-12}
Collective Population (Los Alamos townsite, 3.4 mi)	3.6×10^{-3} person-mrem	1.6×10^{-9}

4.2.2 Worker Impacts

The dose range estimated for WETF personnel is 5 to 200 mrem per year (DOE 1991). This dose is for all normal operational activities, including waste management. If drums are staged outside the WETF, the dose to individuals inside the WETF would be decreased slightly, but would still be within the 5 to 200 mrem/yr range. If the same individual (the involved worker) breathes the air in the drum staging building while adding waste, 15 minutes per week for 50 weeks per year, the individuals' dose would be 0.34 mrem. This exposure and dose would be reduced if the exposure time were less. Risk of excess fatal cancer for that worker is calculated to be 1.4 x 10-7. The DOE Annual Protection Standard for on-site personnel is 5 rem (DOE 1992); LANL as low as reasonably achievable (ALARA) policy is 1 rem (1,000 mrem) per year.

No other WETF personnel would be affected as the tritium would disperse in air before being taken into the WETF ventilation system. The LANL Waste Management personnel who remove the drums would not breath any tritium as they would not open drums and would not enter the WETF laboratories.

4.2.3 Land Use

The location identified for the LLW drum staging building is disturbed and developed as a waste accumulation area; a small area will be paved with asphalt. A security fence is located 9 m (30 ft) southwest of the waste accumulation area. Impact on land use is negligible because the area for the proposed action is only 14 square m (150 square ft) in a site already removed from public use. The location is not a solid waste management unit (SWMU) or an environmental restoration (ER) site (LANL 1992). After use, the building could be moved and used elsewhere at LANL, the asphalt pad could be removed, and the area could be revegetated in accordance with LANL decontamination and decommissioning (D&D) program. No residual contamination is anticipated.

4.2.4 Sensitive Areas

Surveys of the area conducted before construction and operation of the WETF have determined that no sensitive areas would be affected by development on that site. Sensitive areas include floodplains, wetlands, State or Federally listed threatened or endangered species or Federally listed proposed or candidate species or their critical habitat, sole-source aquifers, and cultural resources (DOE 1991).

A survey of TA-16 for cultural resources was recently completed. No cultural resources were found in the vicinity of the WETF. A report was submitted to the New Mexico State Historic Preservation Society (SHPO) documenting that no effect on cultural resources is anticipated (Manz 1992); concurrence has been received (Vozella 1992).

LANL staff biologists have generated a data base of information on threatened and endangered species that might occur in Los Alamos County, along with their expected habitats This information was used together with field surveys was used by the LANL staff biologists to evaluate any potential impact to threatened or endangered species that could result from constructing and operating the LLW Drum Staging Building. The LANL staff biologists concluded that there would be no potential for adverse impact within the proposed project area.

4.3 No Action Alternative Impacts: Stage LLW Drums in the WETF

4.3.1 Airborne Emissions

The airborne emissions from the drums are assumed to be the same as the proposed action: 7.5 mCi annually (0.75 mCi from each of the 10 drums) dispersed within the WETF, which has a volume of 7,400 cubic feet. The complete change in the volume of air in the building, the air change rate, is assumed to be one change per hour.

As stated in Section 4.2.1, the doses and risks of excess cancer fatalities to nearby individuals and populations are included in those calculated for the WETF and are presented in Table 1. Doses and risk of cancer fatality due to managing the LLW in drums are shown in Table 2. These doses and risk of cancer fatality would not be affected by the location of the waste drums.

4.3.2 Worker Impacts

The dose to the involved worker who adds waste to the drum inside the WETF building would be the same as the dose to the involved worker adding waste to the drum in the drum staging building, as presented in Section 4.2.2. Assuming that others of the WETF staff are in the facility 2,000 hours per year (50 weeks at 40 hrs/wk), the individual dose due to opening the drums would be 2 x 10-5 mrem per person per year. This is included within the dose estimate of 5 to 200 mrem/year for WETF personnel (DOE 1991). The WETF staff is assumed to be 10 individuals or less. The total dose would be 2 x 10-4 person -mrem/year. Using the cancer conversion rate noted above the risk of excess fatal cancers among the WETF staff would be 8 x 10-11 for a yearÆs exposure.

4.3.3 Land and Space Use

No additional land outside the WETF would be used. The LLW drums would continue to be staged in the WETF laboratories where tritium is handled, with one drum being staged at a time. The drums would restrict use of laboratory space and would hamper movement of personnel. As each drum is filled, LANL waste management personnel would be called to remove it from the WETF loading dock to TA-54, Area G.

4.3.4 Sensitive Areas

No additional structure would be erected; there would be no chance of impact to sensitive areas.

4.4 Cumulative Impacts

The cumulative effects of the proposed action would consist of a prefabricated, portable building occupying 150 square feet of space adjacent to and outside the WETF. The building could be moved to another area without difficulty, and the site could then be reclaimed. There should be no residual soil contamination as the building would rest on an asphalt pad. The no-action alternative requires no new building.

The cumulative effect of tritium released from the waste drums at the WETF is included in the EA for that facility, where all operations were incorporated within a generous source term. The annual tritium emission assessed was 400 Ci whereas the realistic annual emission estimate is 25 Ci. Because the laboratory air does not flow through a tritium capture system unless air concentration reaches 0.5 mCi /m3, the small leakage from the waste drums would be released to the environment whether the drums are located within the WETF or in the proposed staging building.

No additional solid waste would be generated with either alternative. There would be no effluents from either the proposed action or the no-action alternative.

4.5 Future Foreseeable Actions

Future foreseeable actions would include only routine maintenance of the building.

5.0 PROBABILITIES AND CONSEQUENCES OF ACCIDENTS

Abnormal events that could cause the release of tritium into the work area and environment have been selected as a means of comparing the risks of excess fatal cancers from the proposed action and the no-action alternative. The scenarios have been selected to bound situations that could occur during the lifetime of the facility, assuming that all standard operating procedures are followed and suppression and protection systems function as expected. The risks presented are those of additional cancer fatalities, assuming that the release occurred. The probability of the accident itself is not a part of this risk calculation.

For unplanned releases in the two accident scenarios, the doses (CEDE) were calculated. For each accident the material is assumed to be released in a single instantaneous release. The Puff type atmospheric dispersion model was used to calculate the concentrations (Turner 1971). Conservative meteorological conditions were used for each scenario.

Accident-related doses are calculated using the AIRDOS-EPA for the project worker nearest the drums, for the worker in the Building 450 which is an adjacent facility (DOE 1988b), for the maximum individual dose (MID), and for the population living in Los Alamos townsite. For an accident, the MID is defined as a member of the public who happens to be at the nearest site boundary just at the time of the accident rather than the individual who lives nearest to the facility. In this case, the accident-related MID is at the nearest site boundary on West Jemez Road (Figure 2).

5.1 Selection of Events for Analysis

The two abnormal events considered below are the rupture of a single filled drum and a fire involving all eight filled drums. It would be difficult to rupture the double drum and such an incident has not been reported during routine handling. The probability is considered very low. A fire in the WETF is not considered "credible" (LANL 1989, DOE 1991) due to lack of ignition source and low fuel loading. The LLW drum staging building would contain no ignition sources.

5.2 Drum Puncture

A drum is assumed to be punctured by some accident such as a misdirected forklift tine as the filled drum was being moved. The volatile fraction of the tritium, assumed to be 0.75 mCi as tritiated water vapor, is released and disperses into the staging building or WETF laboratory. Loss of material from the inner drum is unlikely because the puncture hole would be about 1.5 in. by 5 in. Any spill would be readily cleaned up.

Proposed Action

The tritium disperses into 10% of the staging building air space (34 cubic m). An individual adjacent to the punctured drum who inhales tritiated water vapor for 15 minutes could receive a dose of 68 mrem. Doses and risk of excess fatal cancers to individuals in the adjacent building, at the nearest site boundary, and at the nearest inhabited public site, as well as the dose and risk of excess fatal cancers for the collective population of Los Alamos are shown in Table 3. Risk of excess fatal cancers, if this accident did occur, would be 1.6 x 10-10 for the individual in the nearest building (the uninvolved worker) and 4.3 x 10-9 for the population of the Los Alamos townsite if the wind were blowing in that direction.

No-Acton Alternative

If the drum puncture were to occur in the WETF laboratory, which is a larger space (7,400 cubic feet), the release would be the same: 0.75 mCi. An involved worker immediately adjacent to the drum, inhaling tritiated water vapor for 15 minutes, could receive approximately the same dose, 68 mrem, assuming no diffusion. The expected dose to an individual in the WETF laboratory would be 2.0×10^{-6} mrem. All other doses and risk of excess fatal cancers would be the same as those shown in Table 3 for the proposed action.

Table 3: Radiation Doses and Risks of Excess Fatal Cancers for Accident Scenarios

Drum Puncture[a]		
Location	**CEDE**	**Risk of Excess Fatal Cancers**
Adjacent Building (100m)	6.6×10^{-3} mrem	2.6×10^{-9}
Site Boundary Maximum	7.6×10^{-4} mrem	3.8×10^{-10}
Maximum Individual[c]	3.0×10^{-4} mrem	1.5×10^{-10}
Collective Population (Los Alamos townsite)	1.4×10^{-1} person-mrem	7.0×10^{-8}

Fire[b]		
Location	**CEDE**	**Risk of Excess Fatal Cancers**
Adjacent Building (100m)	6.6×10^{-3} mrem	2.6×10^{-9}
Site Boundary Maximum	7.6×10^{-4} mrem	3.8×10^{-10}
Maximum Individual[c]	3.0×10^{-4} mrem	1.5×10^{-10}
Collective Population (Los Alamos townsite)	1.4×10^{-1} person-mrem	7.0×10^{-8}

a. Doses are the same for the proposed action and for the no-action alternative.
b. Doses are for the proposed action only.
c. The maximum individual dose is calculated for the nearest inhabited public site, Bandelier Campground.

5.3 Fire

Due to the lack of ignition source, free combustible material, and closed drums, a fire involving 8 drums is not a reasonably foreseeable event. However, a fire is assumed to involve all drums, releasing all 12 mCi of tritium as tritiated water vapor.

Proposed Action

An individual in the vicinity of the drum staging building is assumed to immediately evacuate into the WETF to call for fire control and thereby escape any dose. Dose and risk of excess fatal cancer calculations are shown above in Table 3. Risk of excess fatal cancers, if this accident did occur, would be 2.6×10^{-9} for the individual in the nearest building (the uninvolved worker) and 7.0×10^{-8} for the population of the Los Alamos townsite if the wind were blowing in that direction.

No-Action Alternative

Smoke would activate a fire alarm and fire suppression system within the WETF. All personnel within the facility would be expected to evacuate. The County Fire Department would respond to the alarm. If such an incident were to occur, the Emergency Tritium Cleanup Subsystem could be activated to remove all tritium from the building air before exhausting it to the environment. In this case, no individuals outside the facility would receive any dose and therefore could not suffer any risk of developing fatal cancer from a drum fire occurring inside the WETF.

5.4 Comparison of Risk from the Proposed Action and the No-Action Alternative

The proposed action is associated with a slightly higher possible dose to the nearest individual and corresponding fatal

cancer risks in the case of a drum puncture. In case of a fire, the proposed action is also associated with higher doses and fatal cancer risks to individuals in the adjacent facility and to members of the public. However, the doses are many orders of magnitude below applicable guidelines and standards. No added cases of cancer in either exposed on-site individuals or members of the public are expected from either accident, regardless of the alternative. The risk of a single additional fatal cancer case, if either accident did occur, could be 2.6×10^{-9} to an exposed individual or 7×10^{-8} to the population of Los Alamos town site.

Normal Operations

The proposed action differs from the no-action alternative only in dose to other individuals working in the WETF, as shown below in Graph 1.

Accidents

The proposed action doses due to drum puncture are the same whether the event occurs in the drum staging building (proposed action) or in the WETF (no-action alternative), as shown below in Graph 2. No doses are expected from a fire with the no-action alternative, however, because of the smoke alarm and fire suppression system within the WETF. (See Graph 2)

6.0 ENVIRONMENTAL CONSULTATION AND REVIEW

6.1 Clean Air Act

The LLW drum staging building has been reviewed to determine whether a permit application to the U. S. Environmental Protection Agency (EPA) is needed. The National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR 61, Subparts A and H, requires that any new or modified facility that will release radioactive materials to the atmosphere must first obtain approval from the EPA Regional Administrator. The drum staging building would not be a new source of emissions as the emissions would be a relocated activity from the WETF.

No other pollutants will be produced at the LLW drum staging building.

6.2 National Historic Preservation Act

Before the WETF was constructed, the area was surveyed by LANL archaeologist who found no cultural or historic sites (Steen 1981, DOE 1991). There is no record of formal consultation with the State Historic Preservation Office (SHPO) or the Advisory Council on Historic Preservation at that time. During the summer of 1991, the area was resurveyed with the same result; no cultural or historic sites were found. A report was submitted to SHPO for their formal concurrence (Manz 1992). The SHPO has concurred in the determination of no effect to historic properties from this undertaking (notation on letter Vozella 1992). The drum staging building would be located within the surveyed area.

6.3 Endangered Species Act

Through semi-annual informal consultation, Laboratory biologists obtain a list of threatened and endangered species from the U. S. Fish and Wildlife, New Mexico Game and Fish, and New Mexico Department of Natural Resources. These species are incorporated into a threatened and endangered database. A survey of the WETF area was conducted by laboratory biologists during the summer of 1990 to determine the presence of any threatened and endangered species utilizing the habitat within the area. None of the possible federal or state threatened or endangered species were found. There has not been any known threatened or endangered species occurrence within this habitat type at LANL. No further consultation was needed.

Graph 1: Annual Individual Doses for Proposed Action and No-Action Alternatives Note: Graphs are on a logarithmic scale.

Graph 2: Accident-Related Individual Doses Note: Graphs are on a logarithmic scale.

7.0 RELATIONSHIP OF THE PROPOSED ACTION TO APPLICABLE FEDERAL, STATE, REGIONAL, AND LOCAL LAND USE PLANS

No known conflict exists with any federal, state, regional, or local land use plans. The land now used by LANL was withdrawn by the Federal Government in 1942 for purposes of national defense. The proposed action does not require that any additional land be withdrawn.

9.0 REFERENCES

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8.0 AGENCIES AND PERSONS CONSULTED

This Environmental Assessment was prepared with the help of:

- New Mexico State Historic Preservation Office (SHPO),
- U.S. Fish and Wildlife (USFW),
- New Mexico Fish and Game, and
- New Mexico Department of Natural Resources.

Table 4: Applicability of Environmental Laws and Permitting

ENVIRONMENTAL REQUIREMENTS	APPLICABILITY
National Environmental Policy	See Section 1.1
Threatened and Endangered Species and Critical Habitat	See Section 4.2.3
Fish and Wildlife Conservation	Not applicable - no water; area is already fenced
Historical/ Cultural (Historic Preservation Act, American Indian Religious Freedom Act)	See Section 4.2.3
Land Use Plan Consistency	See Section 7.0
Floodplain Management	Not applicable - no floodplains affected
Wetlands Protection	Not applicable - no wetlands affected
Farmland Protection	Not applicable - withdrawn for national defense in 1942
	Not applicable - withdrawn for national

Recreation Resources	defense in 1942
Permits for Structures in Navigable Waters (Rivers and Harbors Act)	Not applicable -no navigable waters
Permits for Discharges into Waters of the United States (Clean Water Act - Section 404)	Not applicable - no dredge or fill operations
Permits for Rights-of-Way on Public Lands	Not applicable - only DOE property involved
Clean Air Act	See Section 4.2.1 and 4.3.1
Clean Water Act and Safe Drinking Water Act	Not applicable - no effluents
Resource Conservation and Recovery Act	Not applicable - no hazardous waste
Noise Control Act	Not applicable - no operations
Federal Insecticide, Fungicide, Rodenticide Act	Not applicable - no regulated substances
Toxic Substances Control Act	Not applicable - no PCBs distributed, used, or disposed of
Energy Conservation	Not applicable - no energy used

10.0 GLOSSARY AND OF ABBREVIATIONS AND ACRONYMS

ALARA
: as low as reasonably achievable; dose guidelines

CEDE
: committed effective dose equivalent, a hypothetical whole-body dose that would give the same risk of cancer mortality and/or serious genetic disorder as a given exposure to several target organs; it may be limited to just a few organs

Ci
: curie, a unit of radioactivity; the amount of a radionuclide that undergoes exactly 3.7 x 1010 radioactive disintegrations per second

dose
: term denoting the quantity of radiation energy absorbed

ER
: Environmental Restoration; a program to clean up DOE sites

LANL
: Los Alamos National Laboratory

LLW
: low-level radioactive waste; solid waste that is not classified as high-level waste,transuranic waste, or spent nuclear fuel as defined in Department of Energy Order 5820.2A, "Radioactive Waste Management."

mCi

millicurie, one-thousandth of a curie

MID

maximum individual dose or maximally exposed individual

mixed waste

waste containing both radioactive and hazardous components as defined by the Atomic Energy Act (AEA) and Resource Conservation and Recovery Act (RCRA)

mrem

millirem, one-thousandth of a rem

NEPA

National Environmental Policy Act

person-rem

unit of dose equivalent for a population, used in the field of radiation dosimetry

RCRA

Resource Conservation and Recovery Act

rem

the amount of ionizing radiation required to produce the same biological effect as one roentgen of high-penetration x-rays; unit of dose equivalent for a single individual; used in the field of radiation dosimetry

SWMU

solid waste management unit; a potentially contaminated area

transuranic waste

TRU waste: solid waste that is contaminated with alpha-emitting radionuclides with half-lives >20 years to levels >100nCi/g of waste with the exception of natural and depleted uranium. See Department of Energy/Albuquerque Operations Office Order 5820.2A, "Radioactive Waste Management."

tritium

radioactive (unstable) isotope of hydrogen having an atomic weight of 3, a half-life of 12.26 years, and a specific activity of 10,000 Ci/g; tritium decays to helium-3 (3He) by emitting a 0.018 MeV beta particle.

WETF

Weapons Engineering Tritium Facility

EXPONENTIAL NOTATION

Many values in the text of this Environmental Assessment are expressed in exponential notation. An exponent is the power to which the expression, or number, is raised. This form of notation is used to conserve space and to focus attention on comparisons of the order of magnitude of numbers (see following examples).

Factor by which a unit is multiplied		Prefix	Symbol
1 x 1012	1,000,000,000,000	tera	T
1 x 109	1,000,000,000	giga	G
1 x 106	1,000,000	mega	M
1 x 103	1,000	kilo	k
1 x 102	100	hecto	h
1 x 101	10	deka	da
1 x 100	1		
1 x 10-1	0.1	deci	d
1 x 10-2	0.01	centi	c
1 x 10-3	0.001	milli	m
1 x 10-6	0.000001	micro	m
1 x 10-9	0.000000001	nano	n
1 x 10-12	0.000000000001	pico	p

Figure 1. The Location of Los Alamos National Laboratory

Figure 2. The Location of Technical Area 16 and Los Alamos populated areas

Figure 3. Location of the Proposed LLW Drum Staging Facility at TA-16